

Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to clarify Applicants disclosed and claimed invention.

Support for the amendments is found in the original claims and the Specification.

No new matter has been added.

For example, support for the amendments is found in the original claims, the Figures and in the Specification at paragraphs 0010, 0031 and 0032:

"Within the invention, each of the minimum of two non-overlapping sub-patterns may be **exposed employing separate exposure conditions, such as to effect optimal properties** within a patterned photoresist layer formed from the exposed photoresist layer."

"Fig. 3 illustrates a die pattern that may be formed into a die region within a blanket photoresist layer in accord with the preferred embodiment of

the invention. The die pattern comprises four die sub-patterns including: (1) an isolated die sub-pattern 31; (2) an intricate die sub-pattern 32; (3) a horizontal die sub-pattern 33; and (4) a vertical die sub-pattern 34.

When photoexposing a blanket photoresist layer to form a patterned photoresist layer having formed therein the die pattern as illustrated in Fig. 3, it is often difficult to provide a photoexposed die pattern that in turn develops into a patterned photoresist layer with enhanced dimensional precision. The difficulties often derive from **differences in pattern density, as well as pattern complexity**. The invention is intended to provide a method for compensating for the foregoing differences, such as to provide a patterned photoresist layer with enhanced dimensional precision."

**Claim Rejections under 35 USC 102(b)**

Claims 1 and 3 stand rejected under 35 USC Section 102(b) as being anticipated by Aoki et al. (US 5,298,761).

Aoki et al. disclose a process for eliminating stitching errors (misalignment errors) between adjacent and abutting photoexposed sub-patterns formed by a different reticle to create a composite patterned area (see Abstract; Figure 1A; col 1, lines

35-59; col 2, lines 5-16). In the method of Aoki et al., an amount of deviation of an exposure position with respect to an abutting pattern area is first determined, the deviation is then compensated, and the reticle (original image) is then aligned pattern by pattern (see e.g., see col 2, lines 17-67; claim 1); Aoki et al. disclose that reticles (original images) may contain the same or a different pattern (col 2, lines 45-48). Aoki et al. teach that when image composition is effected **using only a single pattern**, it is only necessary to determine offset values at two abutting portions in one stitching direction (col 22, lines 58-69).

Nowhere do Aoki et al. disclose using different photoexposure conditions with respect to different non-overlapping die patterns.

Thus, Aoki et al. is clearly insufficient to anticipate Applicants disclosed and claimed invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051,

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1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

**Claim Rejections under 35 USC 103(a)**

1. Claim 2 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., above, in view of Eguchi (US 6,220,714).

Applicants reiterate the comments made above with respect to Aoki et al.

Applicants further note that nowhere do Aoki et al. recognize or suggest a solution to the problem that Applicants have recognized and solved by their disclosed and claimed invention:

"A method for exposing a blanket photoresist layer to achieve optimal photoexposure conditions to produce different

non-overlapping die patterns"

Assuming *arguendo* a proper motivation for combination, the fact that Eguchi et al. teach that liquid crystal devices may be made on glass or ceramic substrates does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

2. Claims 4 and 5 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., above, in view of Wolf et al. (Silicon Processing for the CLSA Era, Vol 1).

Applicants reiterate the comments made above with respect to Aoki et al.

Assuming *arguendo* a proper motivation for combination, the

fact that Wolf et al. teach that either positive or negative photoresist may be used in optical lithography does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

3. Claims 6, 8, and 13 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., above, in view of Shibuya et al. (US 5,851,707).

Applicants reiterate the comments made above with respect to Aoki et al.

Shibuya et al. teach **achieving the same photoexposure conditions** (equivalent intensity of illumination light flux) for

singly exposed **photoresist areas** using one mask and multiple exposure photoresist areas using several masks (see Abstract).

Shibuya et al. teach that by altering the light intensity distribution in multiple exposures of the same photoresist area, fine patterns exceeding the resolution limit of the projecting optical system may be produced (col 1, lines 25-32). Shibuya et al. overcome the problem of different linewidths being produced in a multiple exposure area of versus a single exposure area of the photoresist due to different average light intensity exposure of the different areas (col 1, lines 33-40).

Shibuya et al. teach several embodiments whereby either the first mask used for the single exposure are or the multiple masks used for the multiple exposure area **are modified for multiple overlapping exposures** of the **same area** on the photoresist (see e.g., col 6 lines 1-22).

Even assuming arguendo, a proper motivation for combining the teachings of Aoki et al. and Shibuya et al., the combined teachings do not produce Applicants disclosed and claimed invention. Aoki et al. disclose a process for eliminating

stitching errors (misalignment errors) between abutting photoexposed sub-patterns formed by a different reticle to create a composite patterned photoresist area. Shibuya et al., teach multiple exposures **using multiple overlapping mask patterns of a single photoresist area** to equalize the light flux with respect to a single exposure using a single mask on a different photoresist area.

The combined teachings of Aoki et al. and Shibuya et al. do not disclose or suggest:

"exposing within a single die region within the photoresist layer a minimum of **two non-overlapping die sub-patterns** while employing a minimum of two masks, each of said masks associated with one of said non-overlapping die sub-patterns, **each of said non-overlapping die patterns comprising a different pattern subjected to a different photoexposure condition**".

Aoki et al. do not discuss different photoexposure conditions, while Shibuya et al. do not teach non-overlapping die patterns **subjected to a different photoexposure condition**; but rather, Shibuya et al. **teach different areas on the photoresist**



**subjected to the same photoexposure conditions** (e.g., same average light intensity flux).

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

4. Claims 7 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., above, in view of Shibuya et al. as applied to claim 6 and further in view of Eguchi, above.

Applicants reiterate the comments made above with respect to Aoki et al., Shibuya et al., and Eguchi.

Assuming *arguendo* a proper motivation for combination, the fact that Eguchi et al. teach that liquid crystal devices may be made on glass or ceramic substrates does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

5. Claims 9 and 10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., in view of Shibuya et al. as applied to claim 6 and further in view of Wolf et al. above.

Applicants reiterate the comments made above with respect to Aoki et al., Shibuya et al., and Wolf et al.

Assuming *arguendo* a proper motivation for combination, the fact that Wolf et al. teach that either positive or negative photoresist may be used in optical lithography does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when

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combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

6. Claims 11 and 12 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., in view of Shibuya et al. as applied to claim 6 and further in view of Lai et al. (US 6,187,486).

Applicants reiterate the comments made above with respect to Aoki et al. and Shibuya et al.

Lai et al. teach: "A multi-exposure process. By performing the multi-exposure process, the size of the line width can be enlarged or shrunk **by the precondition of the fixed pitch**. Moreover, the line width can be shrunk to a level even smaller than the resolving power of the stepper or the scanner. Additionally, by using the invention, **the exposure energy, the exposure time and the exposure DOF can be fixed while the exposure process is performed**" (see Abstract).

Even assuming *arguendo* a proper motivation for combination, such combination does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicants respectfully point out that "we do not pick and choose among the individual elements of assorted prior art references to recreate the claimed invention, but rather we look for some teaching or suggestion in the references to support their use in a particular claimed combination" *Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 19 USPQ2d 1241 (Fed. Cir. 1991).

7. Claims 14 and 16 stand rejected under 35 U.S.C. 103(a) as

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being unpatentable over Aoki et al., above in view of Lee et al. (USPUB 2004/0197964).

Applicants reiterate the comments made above with respect to Aoki et al.

Even assuming *arguendo* a proper motivation for combination, the fact that Lee et al. teach a method for forming a liquid crystal device including forming a target layer and patterning a photoresist layer over the target layer such combination does not further help Examiner in producing Applicants disclosed and claimed invention and therefore establishing a *prima facie* case of obviousness.

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicants respectfully point out that "we do not pick and choose among the individual elements of assorted prior art

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references to recreate the claimed invention, but rather we look for some teaching or suggestion in the references to support their use in a particular claimed combination" *Symbol Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 19 USPQ2d 1241 (Fed. Cir. 1991).

8. Claim 15 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., in view of Lee et al., above, and further in view of Eguchi, above.

Applicants reiterate the comments made above with respect to Aoki et al., Lee et al., and Eguchi.

9. Claims 17 and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., in view of Lee et al., above, and further in view of Wolf et al. above.

Applicants reiterate the comments made above with respect to Aoki et al., Lee et al., and Wolf et al.

10. Claims 19 and 20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki et al., in view of Lee et al., above, and further in view of Shibuya et al. above.

Applicants reiterate the comments made above with respect to Aoki et al., Lee et al., and Shibuya et al.

### **Conclusion**

The cited references, either individually or in combination, fail to produce Applicants disclosed and claimed invention including Applicants independent claims and therefore are insufficient to make out a *prima facie* case of obviousness.

Moreover, none of the cited references either individually or in combination recognize the problem or provide a solution to the problem that that Applicants have recognized and solved by their disclosed and claimed invention:

"A method for exposing a blanket photoresist layer to achieve optimal photoexposure conditions to produce different non-overlapping die patterns"

Based on the foregoing, Applicants respectfully submit that Applicants Claims are now in condition for allowance. Such

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favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

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